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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,850	09/15/2003	Haowen Lu	TI-36162	2124
23494	7590	08/25/2004	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED			LEE, CALVIN	
P O BOX 655474, M/S 3999				
DALLAS, TX 75265			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/662,850	BU et al.	
	Examiner Lee, Calvin	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 6/21/04 (Election).
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 1-19 and 22-24 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 20 and 21 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 9/15/03 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/15/03</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____                                    |

## OFFICE ACTION

### *Response to Election*

1. The examiner has found a typo error in the Requirement for Restriction sent out 5/26/04, wherein the elected Group B comprises claims 20-21 instead of 20-24. This incident was brought to the attention of the applicant in a brief interview dated 8/10/04.

As a result, claims 1-19 and 22-24 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected claim, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on 6/21/04.

### *Specification*

2. The disclosure is objected to because of the following informalities:

Page 8, replace lines 10-12 with --are formed and located, adjacent to the gate oxide layer 304 and the polysilicon gate 306. Subsequently, a source/drain implant is performed with a n-type dopant such as As and/or P, which forms deep source/drain regions 408--

### *Claim Rejections - 35 U.S.C. § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by *Chapman et al.*

*Chapman et al (US 6,010,929)* discloses a method of fabricating a composite nitride cap:  
- providing an NMOS semiconductor device having active regions, a channel region and a gate  
- forming a liner layer 24 over a portion of the semiconductor device [Fig. 3 and col. 3, ln.11]  
- forming an upper layer 30 on the liner layer wherein the upper layer is substantially thicker than the liner layer and is comprised substantially of nitride [Fig. 4 and col. 4]

### *Claim Rejections - 35 U.S.C. § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made

6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Chapman et al* in view of *Seo (US 5,877,514)*.

*Chapman et al* is silent about “dopants to segregate out of an Si/SiO<sub>2</sub> interface in the channel region during an anneal process.” *Seo* discloses “because the passivation layer can contain a large amount of hydrogen … the hydrogen atoms are freely moveable upon the heat treatment and reach the interface between the channel layer and the gate insulating layer” [col. 7]. Such hydrogen diffusion will inherently segregate dopants (which previously are implanted) out of the interface.

It would have been obvious to one of ordinary skill to have modified the anneal process of *Chapman et al* by utilizing hydrogen diffusion for the purpose of improving an interfacial characteristics between the channel layer and the gate insulating layer.

### *Conclusion*

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: *Anjum et al (US 5,593,907)* discloses “a higher temperature anneal … boron atoms 32 migrate or segregate from the edges of channel region 14 to LDD 20 and/or source/drain 16” [Fig. 3 and col. 4, ln.8]; and *Look (US 6,496,416)* discloses “heat generated by the gate heating structure causes the dopant atoms in the channel to segregate towards the source and drain regions” [col. 2].

8. Any inquiry concerning this communication from the Examiner should be directed to *Calvin Lee* at (571) 272-1896 from 7:00 to 17:00 (Monday-Thursday, Eastern Time). If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2825's Supervisory Patent Examiner *Matthew Smith* can be reached at (571) 272-1907.

Any inquiry relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0596. The central fax number is (703) 872-9306 for all communications to be entered (e.g., amendments, remarks, IDS, etc.)

Patent Examiner



August 18, 2004